

REMARKS

This application has been carefully reviewed in light of the Office Action dated November 28, 2008. Claims 1-9 remain in this application. Claim 1 is the independent Claim. Claim 1 has been amended. Claim 9 is the new Claim. It is believed that no new matter is involved in the amendments or arguments presented herein.

Reconsideration and entrance of the amendment in the application are respectfully requested.

Art-Based Rejections

Claims 1-4 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,776,894 (Watanabe); Claims 5 and 7 were rejected under 35 U.S.C. § 103(a) as obvious over Watanabe in view of U.S. Patent No. 4,926,230 (Yamagishi); Claims 6 and 8 were rejected as obvious in view of Watanabe in view of Japanese Publication JP-59035016 (Nakamura).

Applicant respectfully traverses the rejections and submits that the claims herein are patentable in light of the clarifying amendments above and the arguments below.

The Watanabe Reference

Watanabe is directed to a first and second photovoltaic cell 3 and 4 each having a p-i-n structure to form a tandem p-i-n/p-i-n (or n-i-p/n-i-p) structure (*See, Watanabe; Col. 4, lines 17-34*). A back electrode 5 and n-type layer 43 are disposed on a i-type layer 41 of the second photovoltaic cell 4 (*See, Watanabe; Fig. 1*).

The Yamagishi Reference

Yamagishi is directed to a photovoltaic device of amorphous or microcrystalline semiconductor having a multijunction (*See Yamagishi; Abstract*).

The Nakamura Reference

Nakamura is directed to a hydrogen-containing silicon layer (*See Nakamura, Abstract*).

The Claims are Patentable Over the Cited References

The present application is generally directed to a silicon based thin film solar cell.

As defined by amended independent Claim 1, a silicon based thin film solar cell is provided. A conducted type silicon based low refractive index layer, a silicon based interface layer, and a back electrode are disposed and contact one another in this order on a backside of a photoelectric conversion layer observed from a light incident side.

The applied references fail to disclose or suggest the above features of the claims of the present invention. In particular, the applied references fails to disclose or suggest "a conducted type silicon based low refractive index layer, a silicon based interface layer, and a back electrode are disposed and contact one another in this order on a backside of a photoelectric conversion layer observed from a light incident side," as required by amended independent Claim 1 of the present invention.

Watanabe discloses a first and second photovoltaic cell 3 and 4 each having a p-i-n structure (*See Watanabe; Col. 4, lines 17-34*). In Fig. 12, back electrode 5 is separated from a n-type impurity layer 64 and p-type impurity layer 74 by optically active layer 71 and layers 72 and 73.

In contrast, the present invention requires the low refractive index layer, silicon based interface layer and back electrode to contact one another on the backside of a photoelectric conversion layer observed from a light incident side. This feature provides a silicon based thin film solar cell that exhibits a sufficient light trapping effect to keep a series resistance of the solar cell small even if a layer having a low refractive index is disposed (*See Specification; Page 7, lines 11-20*). Furthermore, the interface layer

improves a contact resistance between the low refractive index layer and a back electrode (*See Specification; Page 2, lines 9-22*).

Moreover, one of ordinary skill in the art would appreciate that a modification of the Watanabe reference according to the present claims would render that reference unsuitable for its intended purpose, and/or principle of operation would be changed (MPEP §2143.01 V, VI).

Watanabe teaches an impurity doped layer of one unit photovoltaic cell which is located at the contact interface with an adjacent unit photovoltaic cell (*See Watanabe, claims 1, 9*). One of ordinary skill in the art would appreciate that impurity layers of Watanabe (*See, Watanabe, Fig. 12, reference numerals 64 and 74*) must be located at the contact interface of two photovoltaic cells and thus cannot contact the back electrode. The impurity layers of Watanabe shows wider band gap so that the layers show lower absorption of light and the photovoltaic efficiency can be accordingly improved (*See, Watanabe, Col.1, lines 60-68 and Col. 1, line 66 to Col. 2, Line 11*). One of ordinary skill in the art would realize that such desired effect can be achieved only if the impurity layers are located at incident side of at least one photovoltaic cell unit.

Thus, Watanabe does not disclose or suggest the above feature of the present invention as required by amended independent Claim 1. The ancillary references do not remedy the deficiencies of Watanabe.

Since the applied reference fails to disclose, teach or suggest the above features recited in amended independent Claim 1, that reference cannot be said to anticipate nor render obvious the invention which is the subject matter of that Claim.

Accordingly, amended independent Claim 1 is believed to be in condition for allowance and such allowance is respectfully requested.

The remaining claims depend either directly or indirectly from amended independent Claim 1 and recite additional features of the invention which are neither disclosed nor fairly suggested by the applied references and are therefore also believed to be in condition for allowance and such allowance is respectfully requested. For example, new dependent Claims 9 and 10 recite the refractive index layer and interface layer to be of a single cell and of the same conductivity type. Neither feature is disclosed or suggested by Watanabe. Thus, Applicant submits that new Claims 9 and 10 further distinguishes the present invention over the art of record.

Conclusion

Applicant believes the foregoing amendments comply with requirements of form and thus may be admitted under 37 C.F.R. § 1.116(b). Alternatively, if these amendments are deemed to touch the merits, admission is requested under 37 C.F.R. § 1.116(c). In this connection, these amendments were not earlier presented because they are in response to the matters pointed out for the first time in the Final Office Action.

Lastly, admission is requested under 37 C.F.R. § 1.116(b) as presenting rejected claims in better form for consideration on appeal.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4721 to discuss the steps necessary for placing the application in condition for allowance.

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If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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By: 

Dariush G. Adli
Registration No. 51,386
Attorney for Applicant(s)

1999 Avenue of the Stars
Suite 1400
Los Angeles, CA 90067
Phone: (310) 785-4600
Fax: (310) 785-4601